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TITLE: Lens comprising at least one oxidized layer and method for forming same

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Oxidizable layer 274 is accessed, for example, by an etch process which creates mesa edge 16. An oxidation process is then performed which substantially oxidizes oxidizable layer 274 in oxidized regions 288. For details, see the discussion with regard to FIG. 5, above. Under the conditions of oxidation, implanted ions 286 modify the oxidation rate of oxidizable layer 274, preferably decreasing the oxidation rate by at least a factor of 1.5 compared to regions of oxidizable layers 274 not receiving the implantation. When layer 274 is oxidized in regions 288, but not in regions 290, lens 272 illustrated in FIG. 11b, is formed. Preferably, implanted ions 286 are dopant ions of either p-type or n-type. Furthermore, when lens 272 is part of a device comprising a p-n junction, it is desirable that the doping type match the side of the junction on which lens 272 resides. For example, if lens 272 is on the p-side, f the junction, it is desirable that implanted ions 286 comprise p-type dopant. This will decrease electrical resistance to the flow of electrical current through lens 272. In some cases, it may be preferred to perform an annealing step to enhance the effect of implantation ions 286. As illustrated in FIG. 11b, regions 288 may have a tapered profile which is at least partially due to the distribution of implanted ions 286 (shown in FIG. 11a).

Also shown is an optional non-oxidizable layer 300. Mask 302, for example a photoresist, blocks bombardment of ions 304 except in preselected regions 306. The result is a distribution of implanted ions 308 which is least dense in the region below the center of mask 302 and more dense to either side. This mbodiment functions similarly to that discussed with regard to FIG. 11, except that the ions increase the oxidation rate by a factor of 1.5 compared to the masked regions of oxidizable layer 296. When layer 296 is oxidized in regions 310, but not in regions 312, lens 294 is formed. Implanted ions 308 maybe dopant ions of either a p-type or n-type. Furthermore, when lens 294 is part of a device comprising a p-n junction, it may be preferable that the doping typ match the sid of th jun tion on which th lens 294 resides. For xampl , if l ns 294 is on th p-sid of th juncti n, it may b preferr d that

implant d i ns 308 compris a p-typ dopant. In s m cas s, it may be pr f rabl to p rf rm an ann aling st p t nhanc th ffect f implant d i ns 308. It is als p ssibl that any of all of lay rs 296, 298 and 300 may b doped prior to implantati n f ions 304. If implant d i ns 308 ar d pant i ns of a given dopant type, it is possible for any or all of layers 296, 298 and 300 to be doped with a dopant of the same or opposite type. As illustrated in FIG. 12b, regions 310 may have a tapered profile which is at least partially due to the distribution of implanted ions 308 (shown in FIG. 12a).